

Appendix I

Noise Analysis



Long Beach Memorial Medical Center Expansion

Noise Impact Analysis

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1. INTRODUCTION

1.1 Project Background

This analysis is undertaken by the City of Long Beach as the Lead Agency to determine if the Long Beach Memorial Medical Center Expansion may have a significant impact to noise in accordance with the State CEQA Guidelines. The assessment of noise considers all phases of project planning, implementation and operation in addressing the environmental checklist form. The proposed project consists of seven proposed project elements (Figure 1.1.1) that could be constructed within the next 5 to 10 years:

1. Todd Cancer Institute (TCI): The TCI would be located on the northwestern corner of the Campus, southeast of the intersection of Long Beach Boulevard and Spring Street. Phase I of the TCI would provide 83,630 gross square feet in a 54-foot-high, three-story building and an atrium featuring a 70-foot-high skylight. Phase II would provide an additional 42,300 gross square feet in a new 33-foot-high, two-story horizontal expansion.
2. Miller Children's Hospital (MCH) Pediatric Inpatient Tower (PIT): The PIT would be located immediately adjacent to the existing MCH facility, southwest of the intersection of Atlantic Avenue and Columbia Street. Phase I of the MIC PIT would consist of a four-story building with one story below grade and three stories above grade. The highest point of the Phase I structure would be approximately 84 feet above grade.
3. Miller Children's Hospital Pediatric Outpatient (POB): The POB would be located south of the existing MCH facility, west of Atlantic Avenue, and approximately midway between Patterson Street and 27th Street. The pediatric outpatient building would consist of a five-story, B-occupancy, medical office building housing an array of pediatric care clinics and support services.
4. Miller Children's Hospital Link Building (LB): The LB a mixed-use building will connect the PIT and the POB and would be located southwest of the intersection of Atlantic Avenue and Patterson Street. The link building tower would consist of a 50-foot-high, three-story building that would contain retail spaces, offices, and retail food service for the users of the adjacent inpatient tower and outpatient building.
5. Roadway Realignment: A 520-linear-foot section of Patterson Street/Memorial Medical Campus Drive as it extends through the Campus would be realigned. This will move the road southward by approximately 300 feet from its current intersection, at Atlantic Avenue near 28th Street on the east side of the Campus. The realignment will result in a closer connection with the existing alignment of Patterson Street at Atlantic Avenue. As a result, the intersection of Atlantic Avenue and 28th Street would become a T-intersection.
6. Utility Trench: The IPT would be served by the central plant building via a 1,000-linear-foot underground utility trench along the eastern edge of the Campus, parallel to Atlantic Avenue. Utility piping between the central plant and the IPT would be direct buried within a protected, slurry back-filled trench.
7. Central Plant Building (CPB): The CPB would be constructed northwest of the intersection of Atlantic Avenue and 27th Street to support Phase I of the new PIT. The central plant building would consist of a single-level structure of approximately 3,500 square feet and approximately 5,000 gross square feet of open yard, plus eight parking stalls. The central plant building would contain equipment and storage for the provision of emergency power, chilled water, and bulk medical oxygen for the IPT.

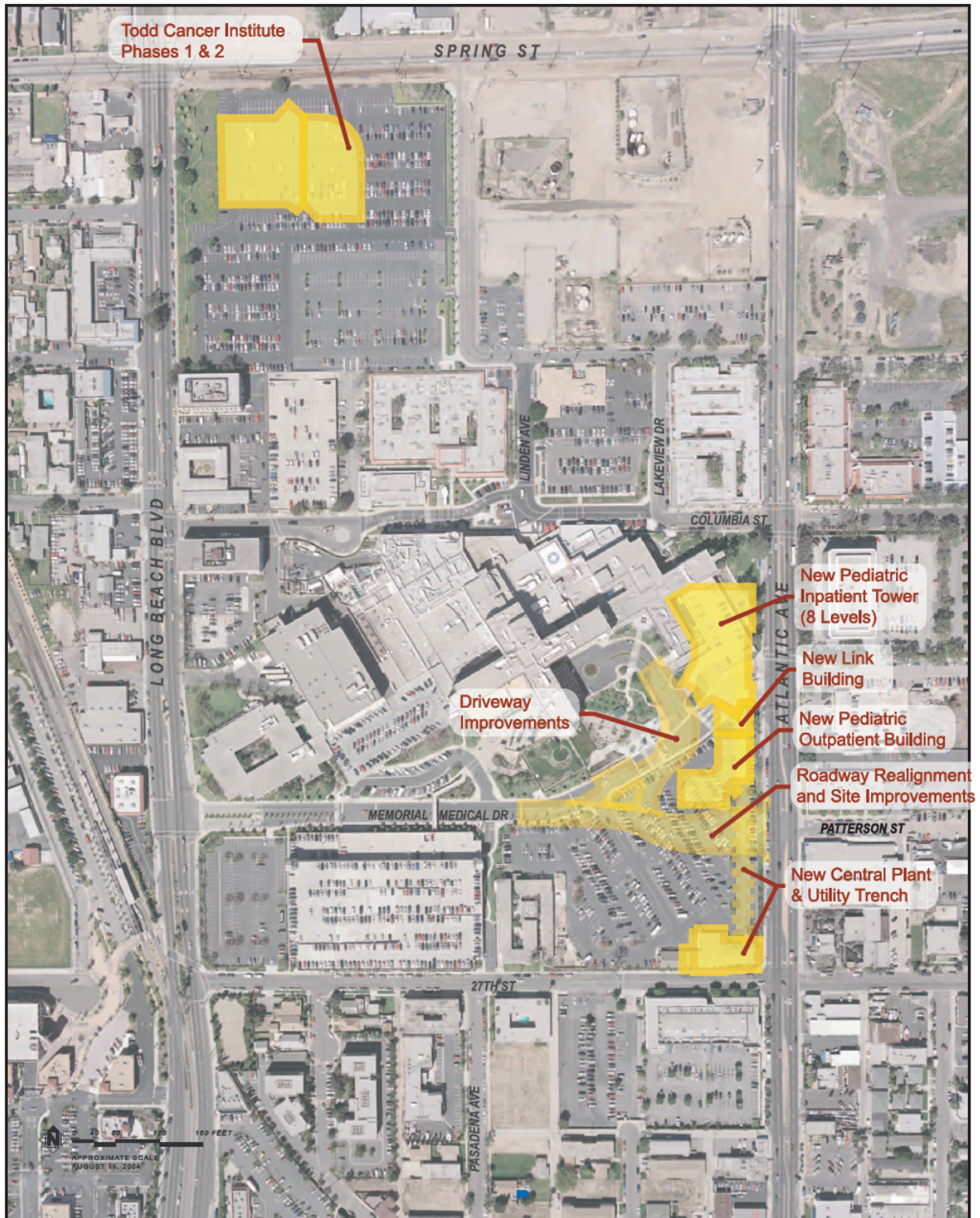


Figure 1.1.1: Project Elements

1.2 Noise Terminology

The following is a brief discussion of noise terminology used in this assessment.

- *Sound*: A vibratory disturbance created by a vibrating objects, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- *Noise*: Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- *Decibel (dB)*: A unit less measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-pascals.
- *A-Weighted Decibel (dBA)*: Overall frequency-weighted sound level in decibels which approximates the frequency response of the human ear.
- *Community Noise Equivalent Level (CNEL)* - A single measurement of community noise exposure. As part of the calculation of CNEL, a 5-dB penalty is applied to each aircraft event that occurs between 7:00 p.m. and 10:00 p.m., and a 10-dB penalty is applied to each aircraft event that occurs between 10:00 p.m. and 7:00 a.m. These penalties reflect that noise occurring during the evening and at night is generally more annoying to people than the same noise occurring during the day because people's sensitivity to noise increases during sleeping hours and nighttime ambient noise levels are typically lower than daytime levels.
- *Equivalent Sound Level (Leq)*: The equivalent steady state sound or vibration level, which in a stated period of time would contain the same acoustical or vibration energy.
- *Ambient*: The total of all noise in the environment, other than the noise from the source of interest. This term is used interchangeably with background noise.
- *Frequency*: The number of times per second that the sine wave of sound repeats itself, or that the sine wave of a vibrating object repeats itself. Expressed in hertz (Hz)
- *Absorption*: A property of materials that allows a reduction in the amount of sound energy reflected. The introduction of an absorbent into the surfaces of a room will reduce the sound pressure level in that room by not reflecting all of the sound energy striking the room's surfaces. The effect of absorption merely reduces the resultant sound level in the room produced by energy that has already entered the room.
- *Vibration*: An oscillatory motion of solid bodies described by displacement, velocity, or acceleration with respect to a given reference point.

1.3 Noise Definition

Noise is defined as unwanted sound. The method commonly used to quantify environmental noise involves evaluation of all frequencies of sound, with an adjustment to reflect the fact that human hearing is less sensitive to low and high frequencies than to midrange frequencies. This measurement adjustment is called “A-weighting.” A noise level so measured is called the A-weighted sound level measured in A-weighted decibels (dBA). In practice, environmental noise is conveniently measured using a sound level meter that includes an electronic filter corresponding to the A-weighted curve. Table 1.3.1 provides examples of typical A-weighted noise levels, their subjective loudness and effects.

Common Noise Source	A-Weighted Sound Level dBA	Subjective Loudness	Effects of Noise
Threshold of Pain	140	Intolerable or Deafening	Hearing Loss
Near jet engine	130		
Hard rock band	120		
Automatic punch press	110	Very Noisy	Speech Interference
Loud auto horn	100		
Power mower	90		
Garbage Disposal	80	Loud	Sleep Disturbance
Commercial jet interior during flight	70		
Normal conversation at 5 – 10 feet	60		
Residential Air Conditioner at 50 feet	50	Moderate	No Effect
Background Level within Residence			
Bird Calls	40	Faint	No Effect
Whisper	30		
Interior of Recording Studio	20		
Rustling Leaves	10	Very Faint	No Effect
Threshold of Hearing	0		

Table 1.3.1 : Common Noise Levels, Loudness and Effects

To account for the fluctuation in noise levels over time, noise impacts are commonly evaluated using time-averaged noise levels. Time averages are typically expressed in terms of the Equivalent Level (Leq), a steady-state energy level equal to the energy content of the time varying period. Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, an artificial decibel increment is added to quiet time noise levels in a 24 hour noise descriptors called the Community Noise Equivalent Level (CNEL) or the Day-Night Level (Ldn). Another measure used to characterize noise exposure is the variations in sound levels over time, percentage exceedance level.

The human response to environmental noise is subjective and varies considerably from individual to individual. The effects of noise can range from interference with sleep, concentration, and communication, to the causation of physiological and psychological stress, and, at the highest intensity levels, hearing loss.

Noise is attenuated as it propagates from the source to the receiver. Attenuation is logarithmic, rather than linear, so that for instance, a doubling of traffic volumes will result in a 3-dBA increase in traffic-dominated noise environments. For line sources, such as streets, noise levels decrease by 3 to 5 dBA for every doubling of distance from the source. For point sources, noise levels decrease quicker, about 6 dBA, for every doubling of distance from the source. Topography and the type of surface (paved or vegetated) also play a role in noise attenuation characteristics.

One way of estimating a person's subjective reaction to a new noise is to compare the new noise with the existing noise environment to which the person has become adapted; i.e., the increase over the so-called "ambient" noise level. Research in the area of perceived impacts of various degrees of increase in A-weighted noise levels, indicates the following:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived.
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference.
- A change in noise level of at least 5 dBA is required before any noticeable change in community response would be expected. A 5-dBA increase is often considered a significant impact.
- A 10-dBA increase is subjectively heard as approximately a doubling in loudness and almost always causes an adverse community response.

In assessing the impact of noise upon the environment, the nature and level of activities that generate the noise, the pathway through which the noise travels, the sensitivity of the receptor, the period of exposure and the increase over the ambient noise levels are all considered.

1.4 Ground borne Vibration/Noise Definition

Vibration is an oscillatory motion, which can be described in terms of the displacement, velocity or acceleration. Because motion is oscillatory, there is no net movement of the vibrating element and the average of any of the motion descriptors is zero. Displacement is the easiest descriptor to understand. For a vibrating floor, the displacement is simply the distance that a point on the floor moves away from its static position. The velocity represents the instantaneous speed of the movement and the acceleration the rate of change of speed.

Although displacement is easier to understand than velocity and acceleration, it is rarely used for describing ground-borne vibration. This is because most transducers used for ground-borne vibration use either velocity or acceleration, and even more important, the response of humans, buildings and equipment to vibration is more accurately described using velocity or acceleration.

The effects of groundborne vibration include felleable movements of the building floors, rattling of windows, shaking of items on shelves or hangings on walls. The rumble is the noise radiated from the motion of the room surfaces. In essence the room surfaces act like a loudspeaker. This is called groundborne noise. In extreme cases vibrations can cause damage to buildings. Typical vibration levels are presented in Table 1.4.1.

Response	Velocity Level (10⁻⁶ inches/sec)	50 Feet from Typical Source
Minor cosmetic damage of fragile buildings	100	Blasting from construction projects
Difficulty with tasks	90	Bulldozer and other heavy tracked construction equipment
Residential annoyance infrequent events	80	Rapid transit upper range
Human response begins Residential annoyance frequent events	70	Rapid transit typical
Sensitive equipment criteria Threshold of perception	60	Bus or truck typical
No impact	50	Typical background vibration level

Table 1.4.1: Typical Levels of Groundborne Vibration

Groundborne vibration is almost never annoying to people who are outdoors, although the motion of the ground may be perceived. Without the effects associated with the shaking of the building, the motion does not provoke the same adverse human reaction. In addition the rumbling noise that usually accompanies the building vibration can only occur inside buildings.

2. REGULATORY FRAMEWORK

2.1 Introduction

The project is located in the city of Long Beach and is subject to the regulatory authority of the City of Long Beach. Therefore for the purposes of this study noise standards as defined by:

- Chapter 8.80 of the Long Beach Municipal Code. This chapter controls unnecessary, excessive and annoyance noise and vibration in the City of Long Beach.
- City of Long Beach General Plan Noise Element
- Title 21 of the California Code of Regulations
- California Department of transportation (Caltrans) Guidelines

will be used to evaluate whether the noise generated by the project is compatible with adjacent land uses. The major noise concerns will be:

- Project Demolition and Construction Noise
- Project Operations Noise (Building Support Systems and Additional Traffic Noise)
- Project Vibration
- Aircraft Noise

Pertinent sections of the different regulations pertaining to the noise sources of concern are summarized here.

2.2 City of Long Beach Municipal Code

Operational Noise

Chapter 8.80 of the Long Beach Municipal Code (LBMC) controls unnecessary, excessive and annoyance noise and vibration in the City of Long Beach. Section 8.80.150 of the LBMC outlines the Exterior noise limits sound levels by receiving land use, Table 2.2.1. It states that no person shall operate or cause to be operated any source of sound at any location within the incorporated limits of the city or allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, which causes the noise level when measured from any other property, either incorporated or unincorporated, to exceed:

1. The noise standard for that land use district as specified in Table 2.2.1 for a cumulative period of more than thirty minutes in any hour; or
2. The noise standard plus five decibels for a cumulative period of more than fifteen minutes in any hour; or
3. 3. The noise standard plus ten decibels for a cumulative period of more than five minutes in any hour; or
4. The noise standard plus fifteen decibels for a cumulative period of more than one minute in any hour; or
5. The noise standard plus twenty decibels or the maximum measured ambient, for any period of time.

If the measured ambient level exceeds that permissible within any of the first four noise limit categories in Table 2.2.1, the allowable noise exposure standard shall be increased in five decibels increments in each category as appropriate to encompass or reflect the ambient noise level.

If the measurement location is on a boundary between two different districts, the noise level limit applicable shall be the arithmetic mean of the two districts.

Table 2.2.1: City of Long Beach Exterior Noise Limits by Receiving Land Use		
Receiving Land Use District	Time Period	Noise Level dBA
District One Predominantly residential with other land use types also present	Night: (10:00 p.m.-7:00 a.m.)	45
	Day: (7:00 a.m.-10:00 p.m.)	50
District Two Predominantly commercial with other land use types also present	Night: (10:00 p.m.-7:00 a.m.)	55
	Day: (7:00 a.m.-10:00 p.m.)	60
District Three Predominantly industrial with other land types use also present	Any time	65
District Four Predominantly industrial with other land types use also present	Any time	70
District Five Airport, freeways and waterways regulated by other agencies	Regulated by other agencies and laws	

Exterior noise limits correction for character of sound (Section 8.80.160): This section states that in the event that alleged offensive noise contains a steady audible tone such as a whine, screech, or hum, or is a repetitive noise such as hammering or riveting or contains music or speech conveying informational content, the standard limits set forth in Table 2.2.1 shall be reduced by 5 dB.

Construction Noise

The LBMC (section (8.80.202) lists the permitted construction times and does not provide specific standards for noise levels associated with construction during the permitted or other times. Variances will be required for construction activities outside of permitted times. Construction activity-Noise regulations apply only to construction activities where a building or other related permit is required or was issued by the building official. The requirements are:

- A. Weekdays and federal holidays: No person shall operate or permit the operation of any tools or equipment used for construction, alteration, repair, remodeling, drilling, demolition or any other related building activity which produce loud or unusual noise which annoys or disturbs a reasonable person of normal sensitivity between the hours of 7:00 PM and 7:00 AM the following day on weekdays, except for emergency work authorized by the building official. For purposes of this section, a federal holiday shall be considered a weekday.
- B. Saturdays: No person shall operate or permit the operation of any tools or equipment used for construction, alteration, repair, remodeling, drilling, demolition or any other related building activity which produce loud or unusual noise which annoys or disturbs a

reasonable person of normal sensitivity between the hours of seven p.m. on Friday and nine a.m. on Saturday and after six p.m. on Saturday, except for emergency work authorized by the building official.

- C. Sundays: No person shall operate or permit the operation of any tools or equipment used for construction, alteration, repair, remodeling, drilling, demolition or any other related building activity at any time on Sunday, except for emergency work authorized by the building official or except for work authorized by permit issued by the noise control officer.
- D. Owner's/employer's responsibility: It is unlawful for the landowner, construction company owner, contractor, subcontractor or employer of persons working, laboring, building, or assisting in construction to permit construction activities in violation of provisions in this section.
- E. Sunday work permits: Any person who wants to do construction work on a Sunday must apply for a work permit from the noise control officer. The noise control officer may issue a Sunday work permit if there is good cause shown; and in issuing such a permit, consideration will be given to the nature of the work and its proximity to residential areas. The permit may allow work on Sundays, only between nine a.m. and six p.m., and it shall designate the specific dates when it is allowed.

Vibration

Section 8.80.200/G outlines the policies and standards relating to operational ground-borne vibration. This section states that, operating or permitting the operation of any device that creates vibration which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred fifty feet (forty-six meters) from the source if on a public space or public right-of-way. For the purposes of this subsection, "vibration perception threshold" means the minimum ground or structure-borne vibrational motion necessary to cause a normal person to be aware of the vibration by such directed means as, but not limited to, sensation by touch or visual observation of moving objects. The perception threshold shall be presumed to be 0.001 g's in the frequency range 0 - 30 hertz and 0.003 g's in the frequency range between thirty and one hundred hertz;

The City of Long Beach has not adopted any standards for groundborne vibration associated with construction activities.

2.3 City of Long Beach General Plan Noise Element

Operational Noise

The Noise Element of the City of Long Beach General Plan suggests criteria for maximum acceptable outdoor and indoor noise levels based on land use type. The criteria are for planning purposes only and do not carry any regulatory authority.

The Noise Element contains a list of specific goals and strategies related to land use planning, the general noise environment, transportation noise, construction and industrial noise, population and housing noise, and public health and safety that can be summarized as follows.

- To protect and preserve both the property rights of owners and the right to quietness of the citizenry at large.
- To make the City a quieter, more pleasant place in which to live.
- To diminish transportation noise impacts on the population.

- To respond to demands for a reasonably quiet environment this is compatible with both existing ambient noise levels and continuing building (i.e., construction noise) and industrial development.
- To reduce both noise exposure to the population and noise level outputs generated by the population.
- To attain the lowest possible level of harmful effects of noise on people by the implementation of information, monitoring, and advisory programs.

The Noise Element of the City of Long Beach General Plan recommends a numerical criteria to judge whether noise from construction and demolition sites is reasonable or not. In considering what criteria will be appropriate in the daytime, most weight is given to the following factors:

1. The noise should not interfere unduly with lives and the work of people in nearby buildings.
2. The work on most construction and demolition sites does not last very long, usually for some weeks or months at most.
3. A great deal of building is done in urban areas where there is noise from other sources, such as traffic.
4. The efficiency of the building industry depends upon the use of machines.
5. Any criterion must be economically and operationally practicable for contractors.

Construction Noise

Based on the above mentioned factors, the Noise Element of the City of Long Beach General Plan suggests an acceptable construction noise level, where an average maximum noise level outside the nearest building at the window of an occupied room closest to the site boundary, should not exceed:

- 70 dBA in areas away from main roads and sources of industrial noise; and
- 75 dBA in areas near main roads and heavy industries.

2.4 Aircraft Noise

California Code of Regulations - Chapter 6. Noise Standards Article 1: The standard for the acceptable level of aircraft noise for persons living in the vicinity of airports is hereby established to be a community noise equivalent level of 65 decibels. These regulations consider the hospital land use as incompatible if the exterior aircraft noise exceeds 65 dBA CNEL. If the exterior noise levels exceed 65 dBA CNEL the building shell construction must provide adequate noise reduction such that the interior noise levels in all rooms used by patients does not exceed an interior CNEL of 45 dB.

The Airport Noise Compatibility Ordinance (LBMC Chapter 16.43), passed in 1995 prevents incompatible properties (i.e., residences, churches, and schools) from being exposed to noise above 65 CNEL. In order to achieve this goal, CNEL budget and enforcement limits have been established for five separate user groups (i.e., air carrier, charter, commuter, general aviation, and industrial) based on the baseline year of 1989-90.

2.5 Roadway Noise

There are no specific requirements for traffic noise in the City of Long Beach regulations. In the absence of such we are evaluating the impact based on California Department of Transportation (Caltrans) requirements. Per Caltrans requirements the determination of whether a noise increase is considered to be substantial is dependent, in part, on the existing noise levels and the Noise Abatement Criteria (NAC 67 dBA Leq(h) for hospital land use). Caltrans considers a noise level increase to be substantial when the proposed project will result in an increase as indicated in Figure below.

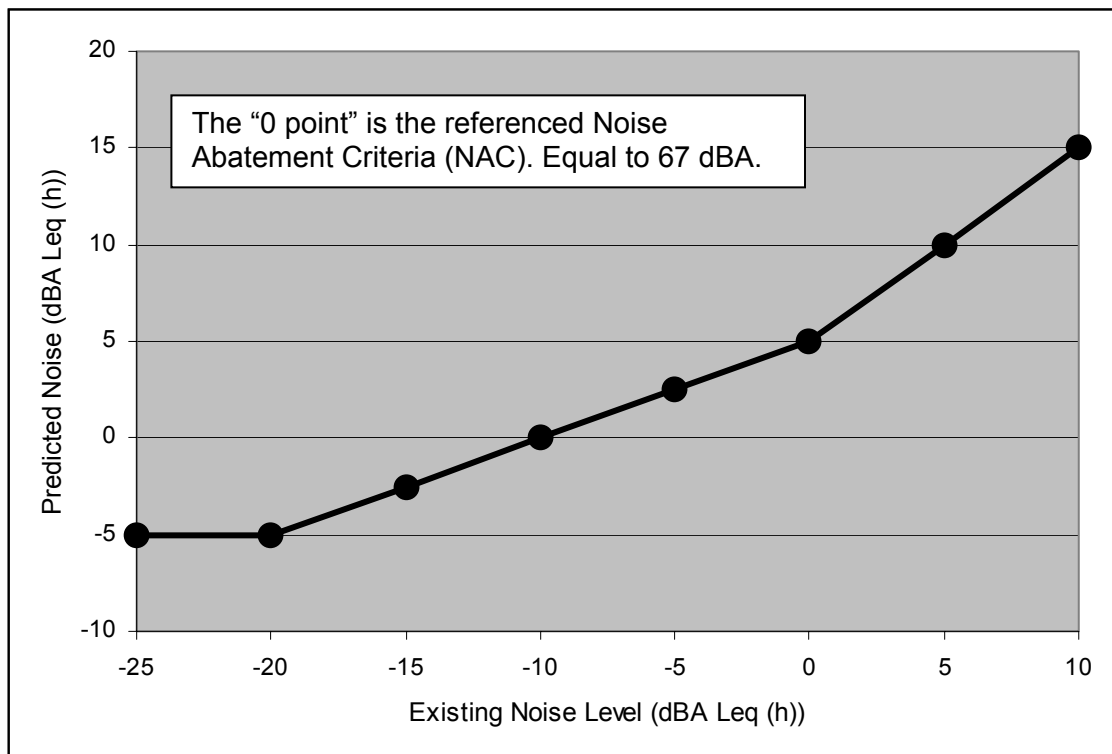


Figure 2.5.1: Substantial Noise Increase for hospital Land Use.

3. EXISTING CONDITIONS

The existing noise environment in the vicinity of the project site is typical of urban areas characterized by noise levels generated by vehicular traffic on nearby streets and Highways and occasional aircraft flyway dogs barking, lawn mowers, etc.

To characterize the existing noise environment at the proposed project site, ambient noise measurements were made during a typical weekday. The measured noise levels and measurement locations are indicated in Figure 3.1.

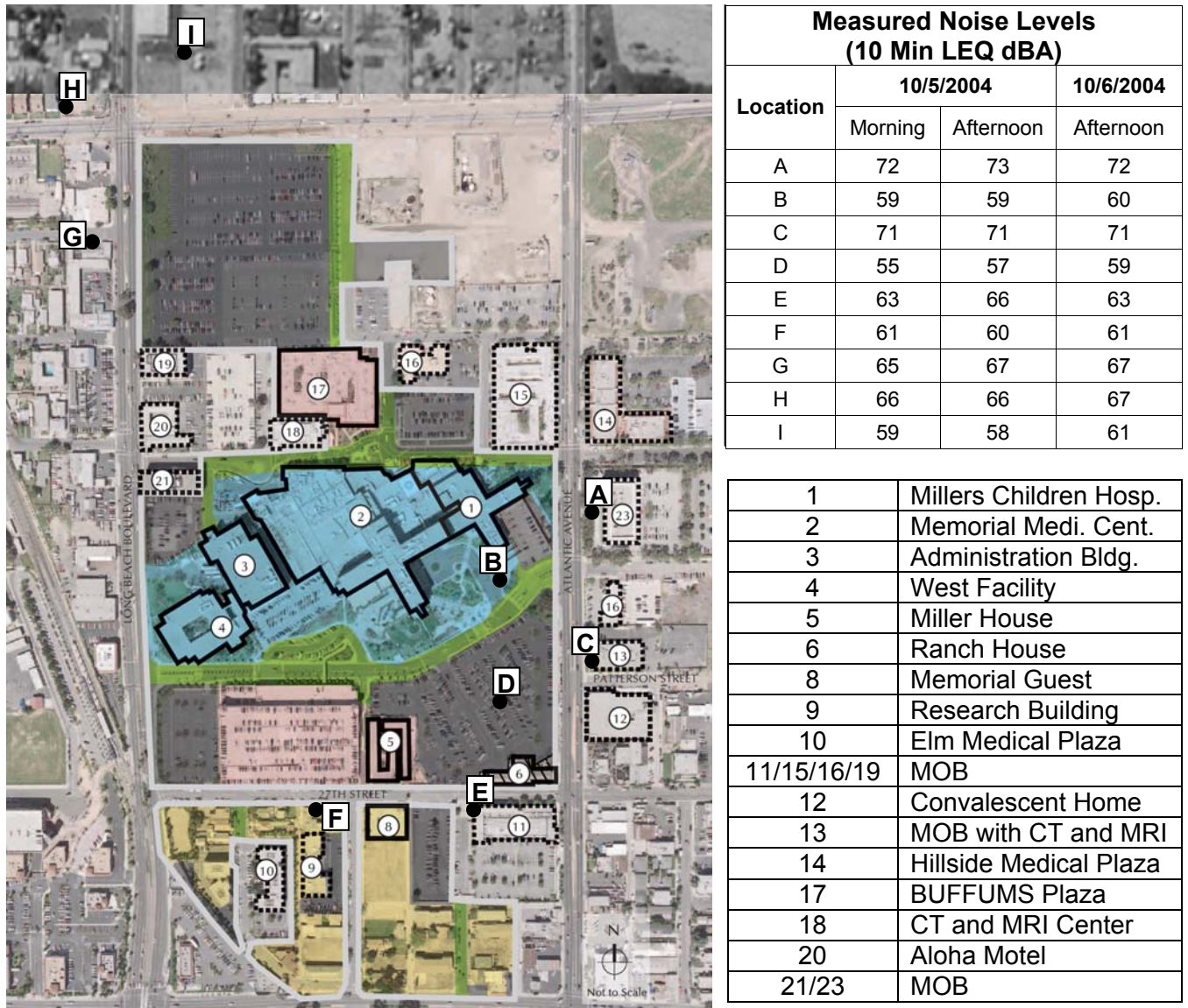


Figure 3.1: Site Plan, Measured Noise Levels and Key Adjacent Buildings

4. SIGNIFICANCE THRESHOLD

The potential for the proposed project to result in impacts related to noise was analyzed in relation to the questions contained in Appendix G of the State CEQA Guidelines:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies
- Exposure of persons to or generation of excessive ground-borne vibration
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project
- For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport, exposure of persons residing or working in the project area to excessive noise levels
- For a project within the vicinity of a private airstrip, exposure of persons residing or working in the project area to excessive noise levels

For the purpose of this analysis, the exposure of persons to or generation of noise level in excess of standards established was determined on the basis of:

- Operational Noise Levels: City of Long Beach Municipal Code
- Construction Noise Levels: City of Long Beach Municipal Code and General Plan
- Operational Vibration Levels: City of Long Beach Municipal Code
- Construction Vibration Levels: No specific requirements
- Roadway Noise: California Department of Transportation Guidelines
- Aircraft Noise: California Code of Regulations and City of Long Airport Noise Compatibility Ordinance

In addition to these requirements, it is important to consider ambient noise level increases. If a given area is characterized by a quiet noise environment and a new noise source is introduced that increases the noise exposure. One way of estimating a person's subjective reaction to a new noise is to compare the new noise with the existing noise environment to which the person has become adapted; i.e., the increase over the so-called "ambient" noise level. Research in the area of perceived impacts of various degrees of increase in A-weighted noise levels, indicates the following:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived.
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference.
- A change in noise level of at least 5 dBA is required before any noticeable change in community response would be expected. A 5-dBA increase is often considered a significant impact.
- A 10-dBA increase is subjectively heard as approximately a doubling in loudness and almost always causes an adverse community response.

Therefore, an increase of 5 dBA or more is generally considered to be a significant environmental impact.

5. IMPACT ANALYSIS

5.1 Introduction

The State CEQA Guidelines recommend the consideration of six questions when addressing the potential for significant impact to Noise. These six questions are discussed in the following sections.

There are several projects with their own sensitive receivers. Noise impact in the following sections is discussed in terms of impact on the nearest sensitive receiver. The nearest sensitive receiver(s) for the different projects are summarized in Table 5.1.1.

Proposed Project	Nearest Sensitive Receiver(s)
Todd Cancer Institute (TCI)	School Located across Long Beach Blvd.
Todd Cancer Institute (TCI)	Single Family Residence North of Long Beach/Spring
Pediatric Inpatient	Medical Office Building Across Atlantic
Pediatric Inpatient	Miller Children's Hospital
Link Building	Medical Office Building Across Atlantic
Pediatric Outpatient	Medical Office Building Across Atlantic
Roadway Realignment	Medical Office Building Across Atlantic
Utility Trench	Convalescent Home
Central Plant	Medical Office Building Across 27th

Table 5.1.1: Nearest Sensitive Receiver(s) for Different Projects

5.2 Question 1: Generation of Noise levels in Excess of Standards

Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

The impact to noise related to exposure or generation of noise levels in excess of established standards from the proposed project is expected to be reduced to below the level of significance with the incorporation of mitigation measures. Discussion of findings:

Construction Noise:

Evaluation of construction noise is divided into allowable construction hours and construction activities.

- Per LBMC (section (8.80.202) Construction is permitted within the hours indicated below. Variance is required outside of these hours.
 - Weekdays: 7:00 AM to 7:00 PM
 - Saturdays: 9:00 AM to 6:00 PM
 - Sundays: No construction is permitted.
- Construction Noise: Construction noise will occur in discreet phases. Average noise levels associated with various construction phases where all pertinent equipment is present and operating at a reference distance of 50 feet are presented in Table 5.2.1.

Range of predicted noise levels at the nearest sensitive receivers for each project during different phases of construction are presented in Table 5.2.2. The construction activities that have a negative impact are shaded Grey in Table 2.2.

Activity	Noise Level at 50 Feet (dBA) (Source: Bolt, Beranek and Newman 1971)
Ground Clearing (Demolition and Grading)	84 dBA
Excavations	89 dBA
Foundations	78 dBA
Erection of Structures	85 dBA
Finishing (i.e., Paving)	89 dBA

Table 5.2.1: Construction Activity Noise Levels at 50 feet

Activity		Project and Impacted Receiver								
		1	2	3	4	5	6	7	8	0
Ground Clearing		62	58	67	84	67	67	67	67	74
Excavations		67	63	72	89	72	72	72	72	79
Foundations		56	52	61	75	61	61	61	61	68
Erection of Structures		63	59	68	85	68	68	68	68	75
Finishing (i.e., Paving)		67	63	72	89	72	72	72	72	79
Permitted Construction Level		75	70	75	75	75	75	75	75	75
1	Todd Cancer Institute (TCI) – Impact on School Located across Long Beach Blvd.									
2	TCI – Impact on Single Family Residence North of Long Beach/Spring									
3	Pediatric Inpatient – Impact on Medical Office Building Across Atlantic									
4	Pediatric Inpatient – Impact on Miller Children’s Hospital									
5	Link Building - Impact on Medical Office Building Across Atlantic									
6	Pediatric Outpatient - Impact on Medical Office Building Across Atlantic									
7	Roadway Realignment - Impact on Medical Office Building Across Atlantic									
8	Utility Trench - Impact on Convalescent Home Across Atlantic									
9	Central Plant - Impact on Medical Office Building Across 27th									

Table 5.2.2: Construction Noise for Different Project at Nearest Sensitive Receiver(s)

In summary:

- Todd Cancer Institute: The construction of this project will not have any negative noise impact and no mitigation measures are required.
- Pediatric Inpatient: The construction of this project will not have any negative noise impact on the medical office buildings across the street but will have a negative impact on the existing Millers Children Hospital Building located within 50 feet of the project. The negative impact is during the Ground Clearing, Excavation, Erection and Finishing phases of the project. Noise reduction of 5 to 14 dBA is required. Mitigation measures required to comply with the project regulatory requirements during the Ground Clearing, Excavation, Erection and Finishing phases of the project:
 - Construction equipment shall be equipped with state of the art noise muffling devices.

- Barriers/curtains shall be installed close to equipment to shield the equipment from the receiver. The height and length of the barrier/curtain shall be determined based on location of construction activity and receiver.
- Because of the close proximity of the source and receiver the impact will be dependent on the location of the noise sources. Prior to start of construction the contractor shall develop noise control plan based on actual equipment to be used and location of various activities. If actual equipment noise levels are not available these shall be measured in the field. The plan should predict the noise levels with the actual equipment and with barrier/curtains. The plan should take into consideration the order of construction and equipment mix. Equipment mix and/or the number of equipment operating shall be considered in reducing the noise levels.
- Link Building: The construction of this project will not have any negative noise impact and no mitigation measures are required.
- Pediatric Outpatient: The construction of this project will not have any negative noise impact and no mitigation measures are required.
- Roadway Realignment: The construction of this project will not have any negative noise impact and no mitigation measures are required.
- Utility Trench: The construction of this project will not have any negative noise impact and no mitigation measures are required.
- Central Plant: The construction of this project will have a negative noise impact during the excavation and the finishing phases of the project and noise reduction of 4 dB is required during these phases of construction. Mitigation measures required to comply with the project regulatory requirements:
 - Construction equipment shall be equipped with state of the art noise muffling devices.
 - Barriers/curtains shall be installed close to equipment to shield the equipment from the receiver. The height and length of the barrier/curtain shall be determined based on location of construction activity and receiver.

Operations Noise Level: Building Support Systems Equipment Noise

Major operational noise sources include fans, air handlers, pumps, etc., located on the roof. Noise from building equipment is commonly controlled using duct lining, sound attenuators, mufflers, enclosures, and barriers. Industry standard design includes these elements. Typical equipment noise levels for commercial buildings of this nature is less than 50 dBA Leq at 50 feet. This is based on measurements/analysis made by VSA n Associates based on Fan data provided by Energy Labs/Trane for a typical project. Based on a noise level of 50 dBA at 50 feet we have predicted the operational noise levels from different projects at different sensitive receivers. The predicted noise levels are presented in Table 5.2.3.

In all cases the predicted operational noise levels are below the project criteria. Therefore building support system noise levels will be in compliance with the project requirements and there will be no significant impact.

In summary, current industry design standards is to attenuate noise levels using duct lining, sound attenuators, mufflers, enclosures, and barriers. VSA and Associates assumes the building will be designed to or above current industry standards. As a guide all exterior equipment should have sound attenuation so that the noise level at 50 feet from any face of the building at any elevation is less than 50 dBA.

Activity	Project and Impacted Receiver								
	1	2	3	4	5	6	7	8	9
Predicted	27	24	32	50	32	32	32	32	40
Criteria	55	45	55	55	55	55	55	55	55
1	Todd Cancer Institute (TCI) – Impact on School Located across Long Beach Blvd.								
2	TCI – Impact on Single Family Residence North of Long Beach/Spring								
3	Pediatric Inpatient – Impact on Medical Office Building Across Atlantic								
4	Pediatric Inpatient – Impact on Miller Children’s Hospital								
5	Link Building - Impact on Medical Office Building Across Atlantic								
6	Pediatric Outpatient - Impact on Medical Office Building Across Atlantic								
7	Roadway Realignment - Impact on Medical Office Building Across Atlantic								
8	Utility Trench - Impact on Convalescent Home Across Atlantic								
9	Central Plant - Impact on Medical Office Building Across 27th								

Table 5.2.3: Building Operation Noise for Different Projects at Respective Sensitive Receiver(s)

Operations Noise Level: Project Traffic Generated Noise

Traffic generated noise levels were predicted using Sound2000, Caltrans’ versions of the Federal Highway Administration’s (FHWA’s) Traffic Noise Prediction Models (FHWA-RD-77-108). The noise levels were predicted using the traffic data provided in the Traffic Analysis Report for this project prepared by Linscott, Law & Greenspan Engineers dated November 4, 2004. The increase in the Noise levels were predicted at various locations around the project. At all locations around the project the increase in the noise levels from increase in the vehicular traffic will be less than 1 dB. The areas with the highest increase on the East, South, West and North sides of the project are identified in Table 5.2.4.

	Locations with the Highest Increase in the Noise Levels			
	2008 AM Peak	2008 PM Peak	2014 AM Peak	2014 PM Peak
East	<1 dB	<1 dB	<1 dB	<1 dB
	Near Atlantic and Columbia	Near Atlantic and Columbia	Near Atlantic and Columbia	Near Atlantic and Columbia
South	<1 dB	<1 dB	<1 dB	<1 dB
	Near 27 th and Atlantic	Near 27 th and Atlantic	Near 27 th and Atlantic	Near Willow and Atlantic
East	<1 dB	<1 dB	<1 dB	<1 dB
	Near Long Beach and Spring	Near Long Beach and Spring	Near Long Beach and Spring	Near Long Beach and Spring
North	<1 dB	<1 dB	<1 dB	<1 dB
	Near Pasadena and Spring	Near Pasadena and Spring	Near Pasadena and Spring	Near Pasadena and Spring

Table 5.2.4: The areas with the highest increase in the Noise Levels on the East, South, West and North sides of the project.

As indicated in Section 4, except in carefully controlled laboratory experiments, a change of 1 dB cannot be perceived. Therefore the traffic generated increase in the noise levels will be in compliance with the project requirements and there will be no significant impact.

Summary

Impacts to noise in relation to exposure or generation of noise levels in excess of established standards would be reduced to below the level of significance by the incorporation of the specified mitigation measures.

5.3 Question 2: Generation of Excessive Groundborne Vibration/Noise Levels

Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

The proposed projects are expected to result in less than significant impacts to noise in relation to generation of excessive groundborne vibration or groundborne noise. Discussion of findings:

As discussed earlier in Section 2.2, for the purposes of this study, significance is based on 0.001 g's in the frequency range 0 - 30 hertz and 0.003 g's in the frequency range between 30 - 100 hertz;

Vibration from building operations will be minimal and well below the criteria. Figure 5.3.1 shows the typical vibration levels at 100 feet from a 4-story building measured by VSA (University of Irvine, Croul Hall). These measurements are from a similar type of project. Although vibration levels will vary depending on project design and soil conditions, our experience on the acoustics, noise and vibration design of over 20 similar buildings indicates that the vibration levels will be of the order of magnitude indicated in Figure 5.3.1 and well below project limit.

Therefore, there are no expected impacts to noise related to generation of excessive groundborne vibration or groundborne noise.

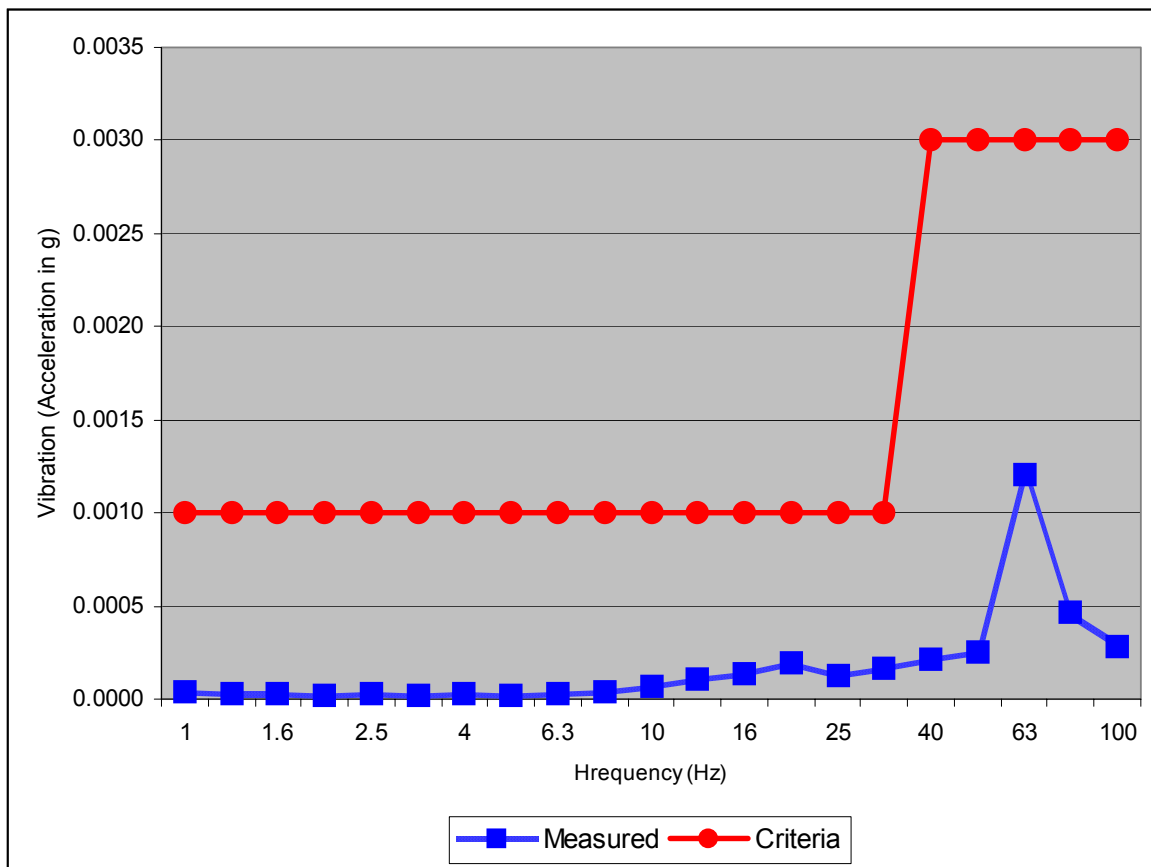


Figure 5.3.1: Predicted Vibration Levels and Project Criteria.

5.4 Question 3: Substantial Permanent Increase in Ambient Noise Levels

A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

The proposed project is expected to result in less than significant impacts to Noise in relation to permanent increases in ambient noise levels. Discussion of findings:

The project governing regulations do not define substantial. In general, one way of estimating a person's subjective reaction to a new noise is to compare the new noise with the existing noise environment to which the person has become adapted; i.e., the increase over the so-called "ambient" noise level. As stated earlier, a 5-dBA increase is often considered a significant increase and thus significant impact. Therefore an increase in the noise levels of 5 dB will be considered substantial.

Permanent increase in the noise levels will occur from operations of the building and additional Traffic generated noise.

Table 5.4.1 presents the predicted and substantial increase noise levels for different projects at respective sensitive receivers from building operations. As indicated in Table 5.4.1, the operational noise levels are below the substantial increase level. Therefore, there will be less than significant increase in the noise levels.

Activity		Project and Impacted Receiver							
		1	2	3	4	5	6	7	8
Predicted		27	24	32	50	32	32	32	32
Substantial Increase Level		70	63	77	64	76	76	76	76
1	Todd Cancer Institute (TCI) – Impact on School Located across Long Beach Blvd.								
2	TCI – Impact on Single Family Residence North of Long Beach/Spring								
3	Pediatric Inpatient – Impact on Medical Office Building Across Atlantic								
4	Pediatric Inpatient – Impact on Miller Children’s Hospital								
5	Link Building - Impact on Medical Office Building Across Atlantic								
6	Pediatric Outpatient - Impact on Medical Office Building Across Atlantic								
7	Roadway Realignment - Impact on Medical Office Building Across Atlantic								
8	Utility Trench - Impact on Convalescent Home Across Atlantic								
9	Central Plant - Impact on Medical Office Building Across 27th								

Table 5.4.1: Permanent Noise Levels from Different Project at Respective Sensitive Receptors.

As indicated in Section 5.2, the increase in the noise will not be perceived. Therefore the traffic generated increase in the noise levels will be in compliance with the project requirements and there will be no impact.

5.5 Question 4: Substantial Temporary Increase in Ambient Noise Levels

A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

The impact to Noise related to temporary or periodic increases in ambient noise levels from the proposed project is expected to be reduced to below the level of significance with the incorporation of mitigation measures.

Temporary and/or periodic noise sources will include demolition and construction activities. Substantial increase with respect to impact significance was defined in response to Question 3 (section 5.4). The noise generated during demolition and construction was estimated in response to Question 1 (section 5.2), and is repeated in Table 5.5.1. The substantial increase level (SIL) based on measured ambient levels is also indicated in Table 5.5.1.

Activity		Project and Impacted Receiver								
		1	2	3	4	5	6	7	8	0
Ground Clearing		62	58	67	84	67	67	67	67	74
Excavations		67	63	72	89	72	72	72	72	79
Foundations		56	52	61	75	61	61	61	61	68
Erection of Structures		63	59	68	85	68	68	68	68	75
Finishing (i.e., Paving)		67	63	72	89	72	72	72	72	79
Substantial Increase Level		70	63	77	64	76	76	76	76	68
1	Todd Cancer Institute (TCI) – Impact on School Located across Long Beach Blvd.									
2	TCI – Impact on Single Family Residence North of Long Beach/Spring									
3	Pediatric Inpatient – Impact on Medical Office Building Across Atlantic									
4	Pediatric Inpatient – Impact on Miller Children’s Hospital									
5	Link Building - Impact on Medical Office Building Across Atlantic									
6	Pediatric Outpatient - Impact on Medical Office Building Across Atlantic									
7	Roadway Realignment - Impact on Medical Office Building Across Atlantic									
8	Utility Trench - Impact on Convalescent Home Across Atlantic									
9	Central Plant - Impact on Medical Office Building Across 27th									

Table 5.5.1: Construction Activity Noise Levels at Resident Across Quill

In summary:

- Todd Cancer Institute: The construction of this project will not have any negative noise impact and no mitigation measures are required.
- Pediatric Inpatient: The construction of this project will not have any negative noise impact on the medical office buildings across the street but will have a negative impact on the existing Millers Children Hospital Building located within 50 feet of the project. The negative impact will occur during all construction phases of the project. Noise reduction of 11 to 25 dBA is required. Mitigation measures required to comply with the project regulatory requirements:
 - Construction equipment shall be equipped with state of the art noise muffling devices.
 - Barriers/curtains shall be installed close to equipment to shield the equipment from the receiver. The height and length of the barrier/curtain shall be determined based on location of construction activity and receiver.
 - Because of the close proximity of the source and receiver the impact will be dependent on the location of the noise sources. Prior to start of construction the contractor shall develop noise control plan based on actual equipment to be used and location of various activities. If actual equipment noise levels are not available equipment noise levels shall be measured in the field. The plan should predict the noise levels with the actual equipment and with barrier/curtains. The plan should take into consideration the order of construction and equipment mix. Equipment mix and/or the number of equipment operating shall be considered in reducing the noise levels.
- Link Building: The construction of this project will not have any negative noise impact and no mitigation measures are required.

- Pediatric Outpatient: The construction of this project will not have any negative noise impact and no mitigation measures are required.
- Roadway Realignment: The construction of this project will not have any negative noise impact and no mitigation measures are required.
- Utility Trench: The construction of this project will not have any negative noise impact and no mitigation measures are required.
- Central Plant: The construction of this project will have a negative noise impact during the Ground Clearing, Excavation, Erection and the Finishing phases of the project. Noise reduction of 1 to 11 dB is required during these phases of construction. Mitigation measures required to comply with the project regulatory requirements:
 - Construction equipment shall be equipped with state of the art noise muffling devices.
 - Barriers/curtains shall be installed close to equipment to shield the equipment from the receiver. The height and length of the barrier/curtain shall be determined based on location of construction activity and receiver.
 - The impact is dependent on the location of the noise sources. Prior to start of construction the contractor shall develop noise control plan based on actual equipment to be used and location of various activities. If actual equipment noise levels are not available equipment noise levels will be measured in the field. The plan should predict the noise levels with the actual equipment and with barrier/curtains. The plan should take into consideration the order of construction and equipment mix. Equipment mix or the number of equipment operating shall be considered in reducing the noise levels.

5.6 Question 5: Project Located within an Airport Land Use Plan

For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

The proposed project is expected to result in no impact to noise in relation to public airports. Discussion of findings:

The nearest public airport/public use airport is the Long Beach airport located approximately over 1.8 miles to the North. Figure 5.6.1, shows the CNEL contours around the Long Beach airport. The project site is well outside the 65 CNEL contour boundaries. Therefore, there are no expected impacts on people working in the project area to noise related to public airports.



Figure 5.6.1: 65 dBA CNEL Contour relative to project site.
 (Source Appendix P, Final EIR, Douglas Park, Lead Agency City of Long Beach)

5.7 Question 6: Project Located within Vicinity of Private Air Strip

For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

The proposed project is not expected to result in impacts to Noise in relation to private airstrips. Discussion of findings:

The nearest private strip is the Torrance airport located approximately 10 miles to the east. Based on the frequency of flights and the type of aircraft, there are no expected impacts on people working in the project area to Noise related to private airstrips.

6. MITIGATION MEASURES

Proposed Project	Mitigation Measures
Todd Cancer Institute	No Mitigation is Required
Pediatric Inpatient	<p>Mitigation is required during all construction phases of the project. Noise reduction of 11 to 35 dBA is required. Mitigation measures:</p> <ul style="list-style-type: none"> • Construction equipment shall be equipped with state of the art noise muffling devices. • Barriers/curtains shall be installed close to equipment to shield the equipment from the receiver. The height and length of the barrier/curtain shall be determined based on location of construction activity and receiver. • Because of the close proximity of the source and receiver the impact will be dependent on the location of the noise sources. Prior to start of construction the contractor shall develop noise control plan based on actual equipment to be used and location of various activities. If actual equipment noise levels are not available these shall be measured in the field. The plan should predict the noise levels with the actual equipment and with barrier/curtains. The plan should take into consideration the order of construction and equipment mix. Equipment mix and/or the number of equipment operating shall be considered in reducing the noise levels.
Link Building	No Mitigation is Required
Pediatric Outpatient	No Mitigation is Required
Road Realignment	No Mitigation is Required
Utility Trench	No Mitigation is Required
Central Plant	<p>Mitigation is required during the Ground Clearing, Excavation, Erection and the Finishing phases of the project. Noise reduction of 1 to 11 dB is required during these phases. Mitigation measures:</p> <ul style="list-style-type: none"> • Construction equipment shall be equipped with state of the art noise muffling devices. • Barriers/curtains shall be installed close to equipment to shield the equipment from the receiver. The height and length of the barrier/curtain shall be determined based on location of construction activity and receiver. • The impact is dependent on the location of the noise sources. Prior to start of construction the contractor shall develop noise control plan based on actual equipment to be used and location of various activities. If actual equipment noise levels are not available these shall be measured in the field. The plan should predict the noise levels with the actual equipment and with barrier/curtains. The plan should take into consideration the order of construction and equipment mix. Equipment mix or the number of equipment operating shall be considered in reducing the noise levels.

All Projects	<ul style="list-style-type: none"> • Project building will be designed to or above current industry standards. Sound to the exterior from building equipment shall be attenuated to or above current industry standards and to meet local noise ordinance. • Construction is permitted within the hours indicated below. Variance is required outside of these hours. <ul style="list-style-type: none"> – Weekdays: 7:00 AM to 7:00 PM – Saturdays: 9:00 AM to 6:00 PM – Sundays: No construction is permitted.
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7. LEVEL OF SIGNIFICANCE AFTER MITIGATION

CEQA Noise Impact Question	No Impact	Less Than Significant	Less Than Significant with Mitigation	Potentially Significant
Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?			X	
Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?		X		
A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?		X		
A substantial temporary or periodic increase in ambient noise levels in the project vicinity about levels existing without the project?			X	
For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?		X		
For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	X			